

**UNIVERSITY OF IDAHO (PWS 2290042)**  
**SOURCE WATER ASSESSMENT FINAL REPORT**

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**August 16, 2001**



**State of Idaho**  
**Department of Environmental Quality**

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## Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *University of Idaho Source Water Assessment Report*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The University of Idaho drinking water supply system consists of two wells. Well 3, located behind Palouse Empire Mall, was drilled to 1337 feet in 1965 and is rated at 2,000 GPM. Well 3 intercepts the Grande Ronde Aquifer with most of the well's production coming from 700 feet below ground surface (bgs). Well 3 is in alternating production with Well 4. Well 4, drilled in 1977 to 747 feet, is also located behind Palouse Mall, and produces 2,000 GPM from the upper Grande Ronde Aquifer. A review of the State drinking water sampling data (DWIMS) indicates that there have been three detections of bacteria since records began being kept in 1992. One sample is directly linked to Well 3 while the other two samples were taken from composite water and could have come from either well or from the delivery system downstream of the wells. Sampling indicates that both wells have had several detections of the inorganic secondary contaminants iron and manganese at levels that exceed Maximum Contaminant Levels (MCL) as recently as winter of 2000. There are no recorded detections of volatile organic contaminants (VOC) like petroleum products or synthetic organic contaminants (SOC) like pesticides for either well.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

DEQ's records indicate that the high IOC (especially iron) content in the local ground water is being removed through a water softening process. This practice should be continued. The source of microbial contamination should be investigated and eliminated. Any spills from Highway 95 or the Union Pacific Railroad should be carefully monitored. Other practices aimed at reducing the leaching of chemicals from agricultural land and the numerous urban potential contaminant sites within the designated source water areas should be implemented. Most of the designated areas are outside the direct jurisdiction of the University of Idaho. Partnerships with state and local agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A community with a fully developed source water protection program will incorporate many strategies. For assistance in developing protection strategies please contact the Boise Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

# **SOURCE WATER ASSESSMENT FOR UNIVERSITY OF IDAHO, LATAH COUNTY, IDAHO**

## **Section 1. Introduction - Basis for Assessment**

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings, used to develop this assessment, is also attached.

### **Level of Accuracy and Purpose of the Assessment**

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

## **Section 2. Conducting the Assessment**

### **General Description of the Source Water Quality**

The University of Idaho Wells 3 and 4 are community wells with 153 connections serving the campus. The two wells are within ¼ mile of one another and are located less than ½ mile north of the Union Pacific Railroad and Highway 8 in Latah County (Figure 1, Appendix A).

Water chemistry problems have been recorded from composite samples of both wells. Trace amounts of the inorganic contaminants (IOC) sulfate, fluoride and sodium have been detected, but at levels below MCL. More significantly, water sample data indicates that there have been three detections of bacteria since DWIMS records initiated in 1992. One sample is directly linked to Well 3 while the other two samples were taken from composite water and could have come from either well or from the delivery system downstream of the wells. Sampling also indicates that both wells have had several detections of the inorganic secondary contaminants iron and manganese at levels that exceed Maximum Contaminant Levels (MCL) as recently as winter, 2000. There are no recorded detections of VOC contaminants like petroleum products or SOC contaminants like pesticides for either well. The primary water quality issue currently facing University of Idaho is that of IOC and microbial contamination and the problems associated with managing this contamination.

### **Defining the Zones of Contribution--Delineation**

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) time-of-travel (TOT) for water associated with the upper Grande Ronde Aquifer in the vicinity of the University of Idaho. The computer model used site-specific data, assimilated by DEQ from a variety of sources including local area well logs. The delineated source water assessment areas for Well 3 and Well 4 are strongly influenced by neighboring drinking water wells to the east and west. These neighboring wells account for the irregularly shaped delineation areas depicted in figures 2 and 3. The actual data used by DEQ in determining the source water assessment delineation areas is available upon request.

### **Identifying Potential Sources of Contamination**

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys and from available databases. The dominant land use outside the University of Idaho area is non-irrigated agricultural, urban residential, the Union Pacific Railroad and other small businesses. Land use within the immediate area of the wellheads consists of a wastewater land application site, a stormwater drainage ditch, a farm road, a major retail shopping mall and a transportation corridor.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this entity is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

### **Contaminant Source Inventory Process**

A two-phased contaminant inventory of the study area was conducted during May of 2000. The first phase involved identifying and documenting potential contaminant sources within the University of Idaho Source Water Assessment Area through the use of computer databases and Geographic Information System maps developed by DEQ. The second or enhanced phase of the contaminant inventory involved contacting the operator to validate the sources identified in phase one and to add any additional potential sources in the area.

There are in excess of 190 potential contaminant sites located within the delineated source water area for Well 3, which underlies Downtown Moscow. The sources include a number of leaking underground storage tanks (LUSTs), underground storage tanks (USTs), a wastewater land application area, service stations, automotive supply and automotive repair shops and other service business that are known to store or produce a variety of potential contaminants. Additionally, all three of the delineation zones for Well 3 are crossed by Highway 95 and the Union Pacific Railroad. Both of these major transportation corridors are potential sources for all types of contaminants (Figure 2, Appendix A). The delineation zones for Well 4 are not as laden with potential contaminant sources as Well 3 but nevertheless include 65 sites including LUSTs, USTs, major treated wastewater discharge into a creek, a wastewater land application area, service stations, automotive supply and automotive repair shops and other service business (Figure 3, Appendix A). Moscow's discharge includes the University of Idaho for a combined population of 26,000.

Tables 1 and 2 (Appendix B) list the contaminant sites for each well, what time of travel zone each site is in, and the type of contaminants each site could have present. Figures 2a and 3a (Appendix A) show the locations of all of the potential contaminant sites for both wells and each well's delineation zones relative to the wellheads.

### **Section 3. Susceptibility Analyses**

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

#### **Hydrologic Sensitivity**

Hydrologic sensitivity is low for both wells ( Table 3, Appendix B). This reflects the nature of the soils being in the poor to moderately well drained class, which could retard the downward movement of contaminants. Well logs indicate that stratigraphy below the soils and within the vadose zones for both wells consists of sufficient amounts of sedimentary clay to further reduce downward flow of contaminants.

#### **Well Construction**

Well construction directly affects the ability of both wells to protect the aquifer from contaminants. The University of Idaho drinking water system consists of two wells that extract ground water for residential uses. Based on a 1996 sanitary survey and well log information, the well system construction scores for both wells are within the low risk range. Although current Idaho Department of Water Resources standards are not being met due to stringent new casing thickness requirements, other requirements including collar seal standards and flood protection standards are being met for both wells. New standards require that a well's annular seal be seated in a low permeability geologic unit.

Based on water chemistry data and local area well logs, the University of Idaho wells are drawing water from the deeper Grande Ronde Aquifer rather than the more shallow and contamination prone Wanapum aquifer.

#### **Potential Contaminant Source and Land Use**

The predominant land use in the area is residential and non-irrigated agriculture. A review of the State drinking water sampling data indicates that there have been three detections of bacteria since records began being kept in 1992. One sample is directly linked to Well 3 while the other two samples were taken from composite water and could have come from either well or from the delivery system downstream of the wells. Sampling indicates that both wells have had several detections of the inorganic contaminants iron and manganese at levels that exceed secondary Maximum Contaminant Levels (MCL) as recently as winter of 2000. Although there are numerous potential contaminant sources that could release VOC or SOC-related pollutants, there are no recorded detections of VOCs including petroleum products or SOCs including pesticides for either well.

## **Final Susceptibility Rating**

Both wells of the University of Idaho drinking water system have an overall high risk rating for IOC contamination. Well 3 has an overall moderate risk rating for VOC, SOC and microbial contaminants while Well 4 has an overall low risk rating for those three categories. The lower risk rating for Well 4 is due to position of the well's delineation zones as shown in Figure 3, Appendix A.

## **Susceptibility Summary**

A review of the State drinking water sampling data indicates that there have been three detections of bacteria since records began being kept in 1992. One sample is directly linked to Well 3 while the other two samples were taken from composite water and could have come from either well or from the delivery system downstream of the wells. Sampling indicates that both wells have had several detections of the inorganic secondary contaminants iron and manganese at levels that exceed Maximum Contaminant Levels (MCL) as recently as winter of 2000. There are no recorded detections of volatile organic contaminants (VOC) like petroleum products or synthetic organic contaminants (SOC) like pesticides for either well. Although the contaminant inventory scores for both wells are similarly high for IOC, VOC and SOC, the final susceptibility scores for Well 4 in those categories is rated as low because Well 4's delineation zones fall in areas with far fewer potential contaminant sources than Well 3. The University of Idaho Water System Susceptibility Analysis Worksheets for Wells 3 and 4 are located in Appendix C of this report.

## **Section 4. Options for Source Water Protection**

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. The primary water quality issue currently facing University of Idaho is the threat of ground water contamination from any of the numerous potential contaminant sources within the delineation zones for Wells 3 and 4. Of particular concern is the presence of IOC and microbial contamination and the problems associated with managing this contamination. Any spills from Highway 95 or the Union Pacific Railroad should be carefully monitored. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. DEQ’s records indicate that the high IOC (especially iron) content in the local ground water is being removed through a water softening process. This procedure should be continued. Most of the designated areas are outside the direct jurisdiction of the University of Idaho. Partnerships with state and local agricultural agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Payette Soil and Water Conservation District, and the Natural Resources Conservation Service.

### **Assistance**

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office      (208) 799-4370

State DEQ Office      (208) 373-0502

Website: <http://www2.state.id.us/deq>



## POTENTIAL CONTAMINANT INVENTORY

### LIST OF ACRONYMS AND DEFINITIONS

**AST (Aboveground Storage Tanks)** – Sites with aboveground storage tanks.

**Business Mailing List** – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

**CERCLIS** – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

**Cyanide Site** – DEQ permitted and known historical sites/facilities using cyanide.

**Dairy** – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

**Deep Injection Well** – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

**Enhanced Inventory** – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

**Floodplain** – This is a coverage of the 100year floodplains.

**Group 1 Sites** – These are sites that show elevated levels of contaminants and are not within the priority one areas.

**Inorganic Priority Area** – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

**Landfill** – Areas of open and closed municipal and non-municipal landfills.

**LUST (Leaking Underground Storage Tank)** – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

**Mines and Quarries** – Mines and quarries permitted through the Idaho Department of Lands.)

**Nitrate Priority Area** – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

**NPDES (National Pollutant Discharge Elimination System)** – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

**Organic Priority Areas** – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

**Recharge Point** – This includes active, proposed, and possible recharge sites on the Snake River Plain.

**RICRIS** – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

**SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities)** – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

**Toxic Release Inventory (TRI)** – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

**UST (Underground Storage Tank)** – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

**Wastewater Land Applications Sites** – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

**Wellheads** – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

**NOTE:** Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

## **References Cited**

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

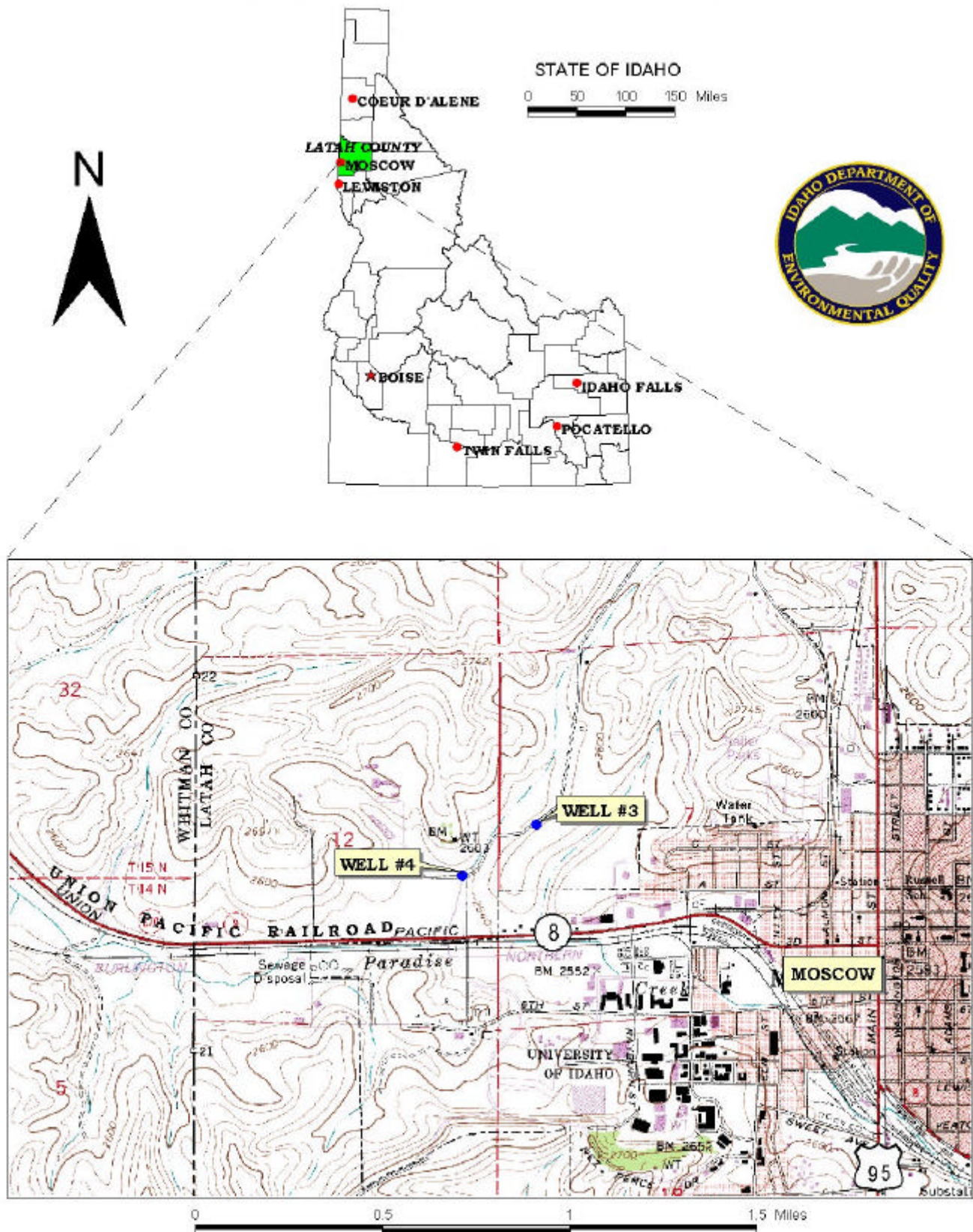
Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

University of Idaho, 2000. Moscow Basin Source Water Assessment. Idaho Water Resources Research Institute. University of Idaho. Moscow, Idaho. December 2000.

## Appendix A

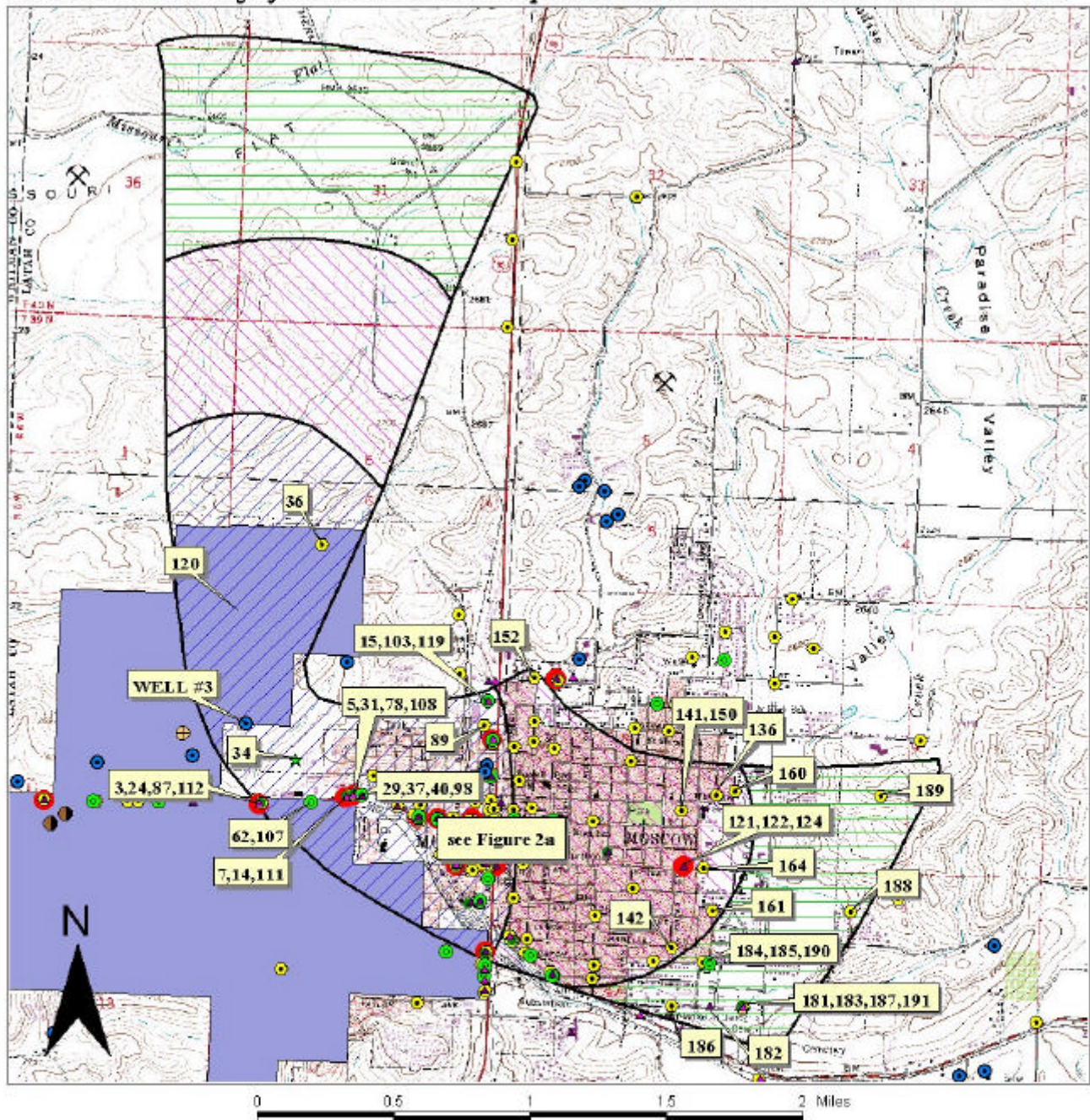
### University of Idaho Water System Figures 1 – 3a

**FIGURE 1. Geographic Location of the University of Idaho Wells**





**FIGURE 2. University of Idaho Delineation Map and Potential Contaminant Source Locations**



**PWS# 2290042**  
**WELL #3**



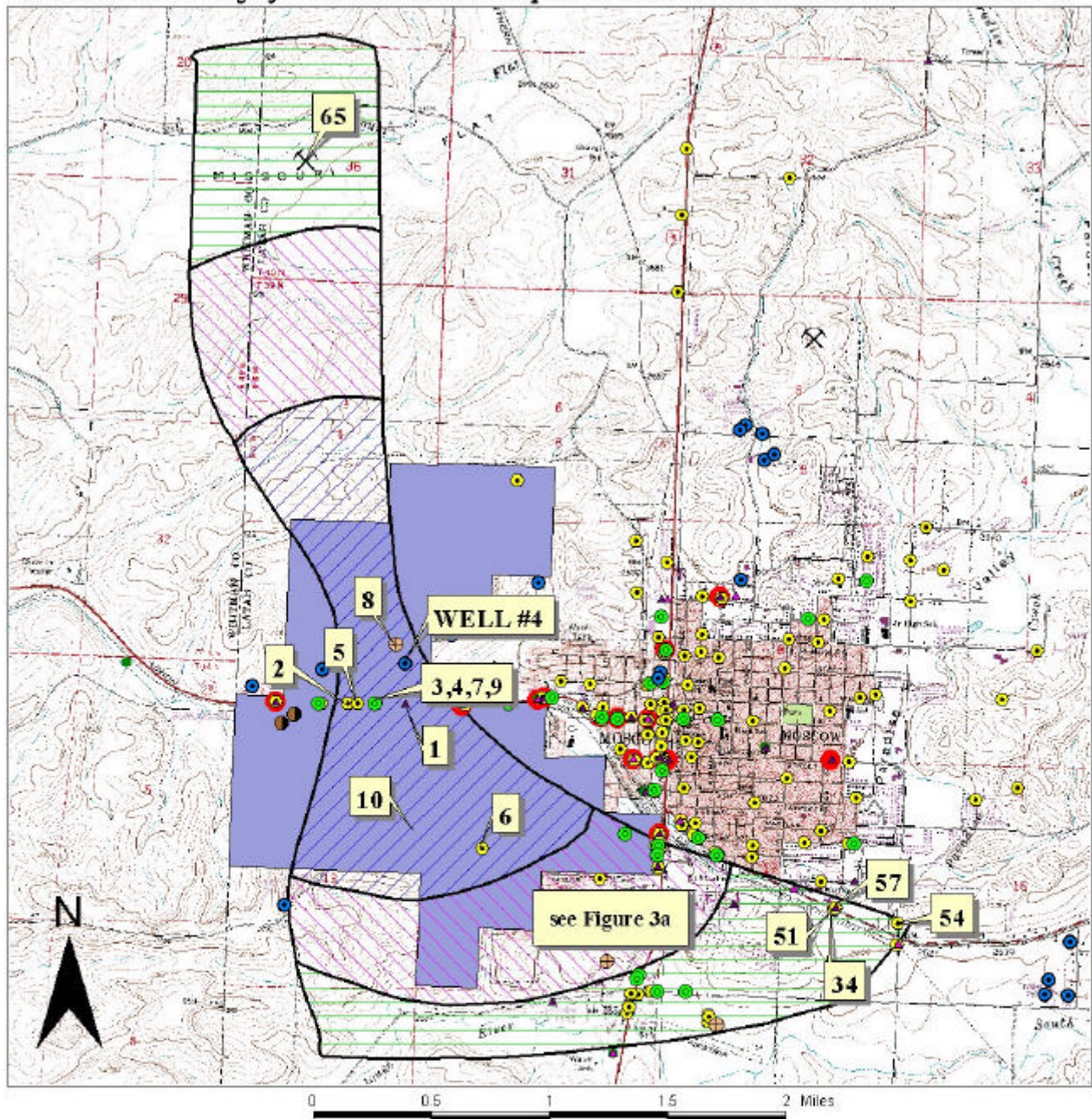
FIGURE 2a. University of Idaho Delineation Map and Potential Contaminant Source Locations



**PWS# 2290023**  
**WELL #3**



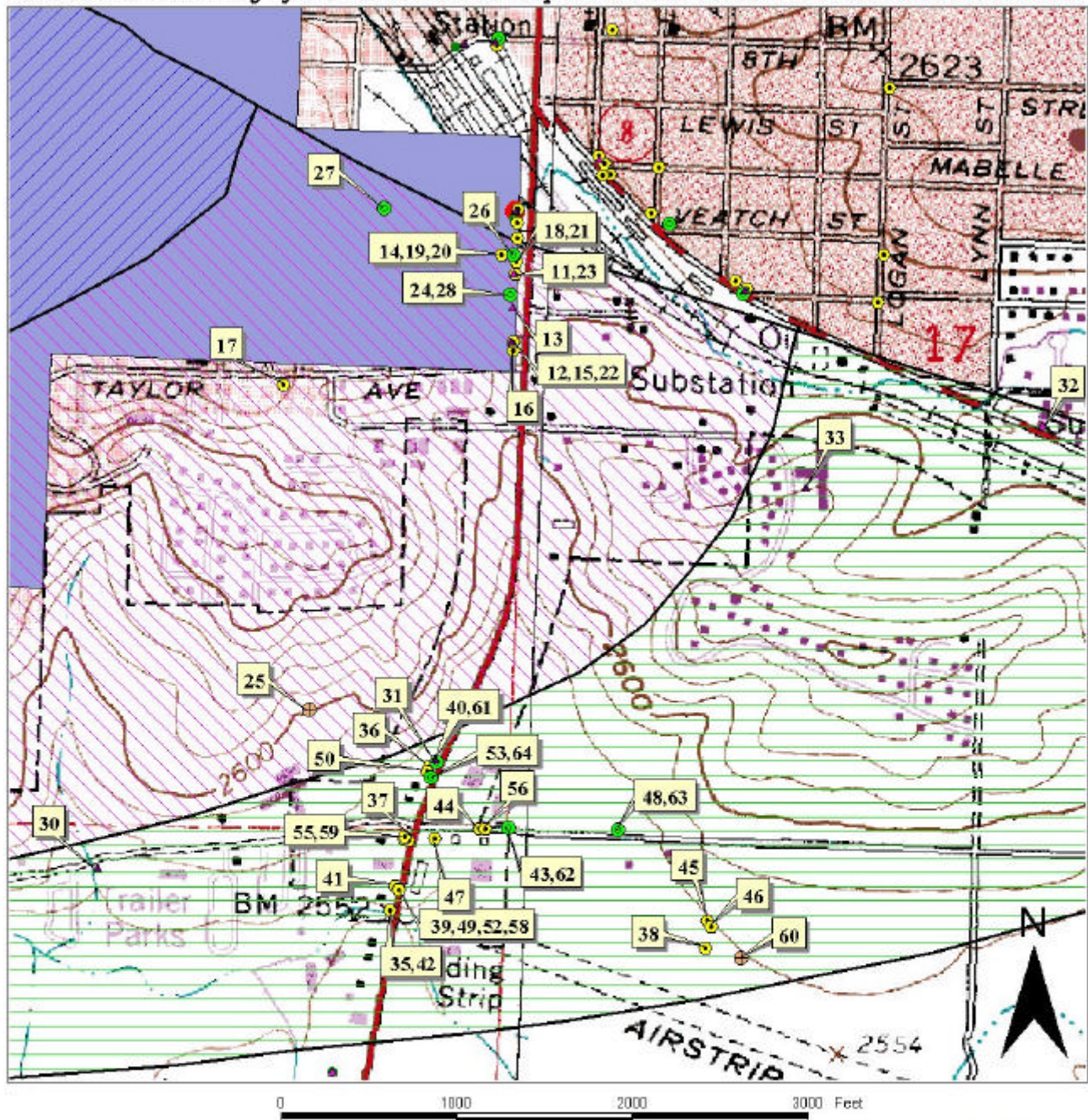
**FIGURE 3. University of Idaho Delineation Map and Potential Contaminant Source Locations**



**PWS# 2290042**  
**WELL #4**



FIGURE 3a. University of Idaho Delineation Map and Potential Contaminant Source Locations



**PWS# 2290042**  
**WELL #4**



## **Appendix B**

### **University of Idaho Water System Tables 1-3**

Table 1. University of Idaho Well 3, Potential Contaminant Inventory

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
1	LUST	3	Database Search	IOC,VOC, M
2	LUST	3	Database Search	IOC,VOC, SOC
3	LUST	3	Database Search	IOC, VOC, SOC
4	LUST	3	Database Search	VOC, SOC
5	LUST	3	Database Search	IOC,VOC, SOC
6	LUST	3	Database Search	IOC, VOC, SOC
7	LUST	3	Database Search	IOC,VOC, SOC
8	LUST	3	Database Search	IOC,VOC, SOC
9	LUST	3	Database Search	IOC, VOC, SOC
10	LUST	3	Database Search	IOC,VOC, SOC
11	LUST	3	Database Search	IOC, SOC
12	UST	3	Database Search	IOC, VOC, SOC
13	UST	3	Database Search	IOC,VOC, SOC
14	UST	3	Database Search	IOC,VOC, SOC
15	UST	3	Database Search	IOC, VOC, SOC
16	UST	3	Database Search	IOC,VOC, SOC
17	UST	3	Database Search	IOC,VOC, SOC
18	UST	3	Database Search	VOC, SOC,M
19	UST	3	Database Search	VOC, SOC
20	UST	3	Database Search	IOC,VOC, SOC
21	UST	3	Database Search	IOC, VOC, SOC
22	UST	3	Database Search	IOC,VOC, SOC
23	UST	3	Database Search	IOC,VOC, SOC
24	UST	3	Database Search	IOC, VOC, SOC
25	UST	3	Database Search	IOC, M
26	UST	3	Database Search	IOC,VOC, SOC
27	UST	3	Database Search	IOC, VOC, SOC
28	UST	3	Database Search	IOC,VOC, SOC
29	UST	3	Database Search	IOC,VOC, SOC
30	UST	3	Database Search	IOC, VOC, SOC
31	UST	3	Database Search	IOC,VOC, SOC
32	UST	3	Database Search	IOC,VOC, SOC
33	UST	3	Database Search	IOC, VOC, SOC
34	Dairy	3	Database Search	IOC,VOC, SOC
35	Photo Shop	3	Database Search	IOC,VOC, SOC
36	Metal Shop	3	Database Search	IOC, VOC, SOC
37	Auto Parts	3	Database Search	IOC, VOC, SOC
38	Auto Dealer	3	Database Search	IOC,VOC, SOC
39	Veterinarian	3	Database Search	IOC, SOC, M
40	Wrecker Service	3	Database Search	IOC, VOC, SOC

**Table 1 (Continued). City of Moscow Well 3, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
41	Tire Company	3	Database Search	IOC,VOC
42	Photo Shop	3	Database Search	IOC, SOC
43	Winery	3	Database Search	IOC, SOC, M
44	Veterinarian	3	Database Search	IOC, SOC, M
45	Medical lab	3	Database Search	VOC, SOC, M
46	Sign Shop	3	Database Search	VOC, SOC
47	Veterinarian	3	Database Search	IOC, SOC, M
48	Paint Shop	3	Database Search	VOC, SOC
49	Computer Manufacturer	3	Database Search	IOC, VOC, SOC
50	Seed and Bulbs	3	Database Search	IOC, SOC, M
51	Seed and Bulbs	3	Database Search	IOC, SOC, M
52	Print Shop	3	Database Search	IOC, VOC
53	Print Shop	3	Database Search	IOC, VOC
54	Food Processor	3	Database Search	IOC, VOC
55	Bike Shop	3	Database Search	IOC, VOC, SOC
56	Glass Tinter	3	Database Search	IOC,VOC, SOC
57	Cleaners	3	Database Search	VOC
58	Hospital	3	Database Search	IOC, SOC, M
59	Hospital	3	Database Search	IOC, SOC, M
60	Machine Shop	3	Database Search	IOC, VOC, SOC
61	Print Shop	3	Database Search	IOC, VOC
62	Print Shop	3	Database Search	IOC,VOC
63	Veterinarian	3	Database Search	IOC, SOC, M
64	Grain Dealer	3	Database Search	IOC, SOC
65	Grain Dealer	3	Database Search	IOC, SOC
66	Trucking Company	3	Database Search	VOC, SOC
67	Auto Repair	3	Database Search	IOC, VOC
68	Veterinarian	3	Database Search	IOC, SOC, M
69	Furniture Repair	3	Database Search	VOC, SOC
70	Auto Repair	3	Database Search	IOC, VOC, SOC
71	Fire Department	3	Database Search	IOC,VOC, SOC
72	Seed Company	3	Database Search	IOC,VOC
73	Public Transit	3	Database Search	IOC, VOC
74	Recycling Center	3	Database Search	IOC,VOC, SOC
75	Recycling Center	3	Database Search	IOC,VOC, SOC
76	Transmission Repair	3	Database Search	IOC, VOC, SOC
77	Auto Dealer	3	Database Search	VOC, SOC
78	Bicycle Dealer	3	Database Search	IOC, VOC, SOC
79	Bus Line	3	Database Search	VOC, SOC
80	Motor Cycle Sales & Repair	3	Database Search	IOC, VOC, SOC

**Table 1 (Continued). City of Moscow Well 3, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
81	Bicycle Repair	3	Database Search	IOC,VOC, SOC
82	Printer	3	Database Search	IOC,VOC
83	Auto Repair	3	Database Search	IOC, VOC, SOC
84	Engraver	3	Database Search	IOC, VOC, SOC
85	Seed Wholesaler	3	Database Search	IOC, VOC
86	Veterinarian	3	Database Search	IOC, SOC, M
87	Auto Supplies	3	Database Search	IOC, VOC, SOC
88	Auto Supplies	3	Database Search	IOC,VOC, SOC
89	Feed and Garden	3	Database Search	IOC, VOC, SOC, M
90	Rental Center	3	Database Search	IOC,VOC, SOC
91	Paint Shop	3	Database Search	IOC, VOC, SOC
92	Gas Station	3	Database Search	IOC, VOC, SOC
93	Power Company	3	Database Search	IOC, VOC
94	Printer	3	Database Search	IOC, VOC
95	Auto Parts	3	Database Search	IOC, VOC, SOC
96	Tree Service	3	Database Search	IOC, SOC
97	Auto Repair	3	Database Search	IOC,VOC, SOC
98	Auto Dealer	3	Database Search	VOC, SOC
99	Paint Shop	3	Database Search	IOC, VOC, SOC
100	Gas Station	3	Database Search	IOC, VOC, SOC
101	Feed and Garden	3	Database Search	IOC, VOC, SOC
102	Cleaners	3	Database Search	VOC
103	Auto Repair	3	Database Search	IOC, VOC, SOC
104	Auto Repair	3	Database Search	IOC, VOC, SOC
105	Auto Repair	3	Database Search	IOC, VOC, SOC
106	Gas Station	3	Database Search	IOC,VOC, SOC
107	Auto Dealer	3	Database Search	VOC, SOC
108	Sport Shop	3	Database Search	IOC,VOC, SOC
109	Grain Supply	3	Database Search	IOC, SOC
110	Grain Supply	3	Database Search	IOC, SOC
111	Gas Station	3	Database Search	IOC,VOC, SOC
112	Gas Station	3	Database Search	IOC,VOC, SOC
113	City	3	Database Search	IOC, VOC, SOC
114	City	3	Database Search	IOC,VOC, SOC
115	Gas Station	3	Database Search	IOC,VOC, SOC
116	Grain Supply	3	Database Search	IOC, SOC, M
117	Grain Supply	3	Database Search	IOC, SOC, M
118	Gas Supply	3	Database Search	IOC, VOC, SOC
119	Phone Company	3	Database Search	IOC, VOC
120	Wastewater Land App	3	Database Search	IOC, M

**Table 1 (Continued). City of Moscow Well, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
121	LUST	6	Database Search	VOC, SOC
122	LUST	6	Database Search	VOC, SOC
123	UST	6	Database Search	VOC, SOC
124	UST	6	Database Search	VOC, SOC
125	UST	6	Database Search	VOC, SOC
126	UST	6	Database Search	VOC, SOC
127	Fuel Supply/UST	6	Database Search	IOC, SOC, SOC
128	Auto Supply	6	Database Search	VOC, SOC
129	Gas Station	6	Database Search	IOC, VOC, SOC
130	Bus Line	6	Database Search	IOC,VOC, SOC
131	Veterinarian	6	Database Search	IOC, SOC, M
132	Printer	6	Database Search	IOC, VOC
133	General Contractor	6	Database Search	IOC, VOC
134	Veterinarian	6	Database Search	IOC, SOC, M
135	Auto Electric	6	Database Search	IOC, VOC, SOC
136	Janitorial Service	6	Database Search	IOC,VOC
137	Chemical Supplies	6	Database Search	IOC,VOC, SOC
138	Veterinarian	6	Database Search	IOC, SOC, M
139	Auto Dealer	6	Database Search	IOC, VOC, SOC
140	Veterinarian	6	Database Search	IOC, SOC, M
141	Veterinarian	6	Database Search	IOC, SOC, M
142	Household Storage	6	Database Search	IOC,VOC, SOC
143	General Contractor	6	Database Search	IOC, VOC, SOC
144	Photo Shop	6	Database Search	IOC, VOC
145	Auto Shop	6	Database Search	IOC, VOC, SOC
146	Radiator Shop	6	Database Search	IOC,VOC, SOC
147	Engine Repair	6	Database Search	IOC, VOC, SOC
148	General Contractor	6	Database Search	IOC,VOC, SOC
149	Taxidermist	6	Database Search	IOC, SOC, M
150	Veterinarian	6	Database Search	IOC, SOC, M
151	Veterinarian	6	Database Search	IOC, SOC, M
152	Furniture Shop	6	Database Search	IOC,VOC, SOC
153	Car Wash	6	Database Search	IOC, VOC, SOC
154	Floor Refinishing	6	Database Search	VOC, SOC
155	Water Treatment Supply	6	Database Search	IOC,VOC, SOC
156	RV Repair	6	Database Search	IOC, VOC, SOC
157	Car Wash	6	Database Search	IOC, VOC, SOC
158	Farm Supplies	6	Database Search	IOC, VOC
159	Auto Parts	6	Database Search	IOC, VOC, SOC
160	Taxidermist	6	Database Search	IOC, SOC, M

**Table 1 (Continued). City of Moscow Well 3, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
161	Printer	6	Database Search	IOC,VOC
162	General Contractor	6	Database Search	IOC,VOC, SOC
163	General Contractor	6	Database Search	IOC, VOC, SOC
164	Funeral Home	6	Database Search	IOC, SOC
165	Gas Station	6	Database Search	IOC, VOC, SOC
166	Seed Wholesaler	6	Database Search	IOC, SOC, M
167	Transmission Shop	6	Database Search	IOC, VOC, SOC
168	Auto Repair	6	Database Search	IOC,VOC, SOC
169	Forestry Service	6	Database Search	IOC, VOC, SOC
170	Federal Site	6	Database Search	IOC,VOC, SOC
171	Printer	6	Database Search	IOC,VOC
172	Auto Parts	6	Database Search	IOC, VOC, SOC
173	City Government	6	Database Search	IOC, VOC, SOC
174	Auto Shop	6	Database Search	IOC, VOC, SOC
175	Lube Shop	6	Database Search	IOC, VOC, SOC
176	Auto Shop	6	Database Search	IOC, VOC, SOC
177	Farm Supplies	6	Database Search	IOC, SOC
178	Farm Supplies	6	Database Search	IOC, SOC
179	Communications	6	Database Search	IOC, SOC
180	Municipal	6	Database Search	IOC, M
181	Gas Station	10	Database Search	IOC,VOC, SOC
182	Local Government	10	Database Search	VOC, SOC
183	Tire Dealer	10	Database Search	IOC, VOC, SOC
184	State Government	10	Database Search	IOC, VOC, SOC
185	State Government	10	Database Search	IOC, VOC, SOC
186	Engine Repair	10	Database Search	IOC, VOC, SOC
187	Auto Repair	10	Database Search	IOC,VOC, SOC
188	Taxi Service	10	Database Search	IOC, VOC, SOC
189	Building Contractors	10	Database Search	IOC,VOC, SOC
190	State Government	10	Database Search	IOC,VOC, SOC
191	Machine Shop	10	Database Search	IOC, VOC, SOC
192	Highway 95	10	Database Search	IOC, VOC, SOC, M
193	Railroad	10	Database Search	IOC, VOC, SOC, M

LUST = leaking underground storage tank, UST = underground storage tank,

SARA = Superfund Amendments and Reauthorization Act site

<sup>2</sup>TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

<sup>3</sup>IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

M = microbials

**Table 2. University of Idaho Well 4, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
1	UST	3	Database Search	VOC, SOC
2	Cleaners	3	Database Search	VOC
3	Cleaners	3	Database Search	VOC
4	Photo Shop	3	Database Search	IOC, VOC
5	Paint Shop	3	Database Search	IOC,VOC, SOC
6	Golf Course	3	Database Search	IOC, VOC, SOC
7	Federal Government	3	Database Search	IOC,VOC, SOC
8	Land Fill	3	Database Search	IOC,VOC, SOC, M
9	Cleaners	3	Database Search	VOC
10	Wastewater Land Application	3	Database Search	IOC, M
11	Fuel Supplier	6	Database Search	IOC, VOC, SOC
12	UST	6	Database Search	VOC, SOC
13	UST	6	Database Search	VOC, SOC
14	Photo shop	6	Database Search	IOC,VOC, SOC
15	Moving Company	6	Database Search	IOC, VOC, SOC
16	Electrical Equipment	6	Database Search	IOC,VOC
17	Cabinet Shop	6	Database Search	VOC, SOC
18	Metal Fabrication	6	Database Search	IOC, VOC, SOC
19	Research Lab	6	Database Search	IOC,VOC, SOC, M
20	Control Systems	6	Database Search	IOC,VOC, SOC
21	Auto Repair	6	Database Search	IOC, VOC, SOC
22	Trucking Company	6	Database Search	IOC,VOC, SOC
23	Fuel Supply	6	Database Search	VOC
24	Forestry Service	6	Database Search	VOC, SOC
25	Land Fill	6	Database Search	IOC, VOC SOC, M
26	Bulk Oil Service	6	Database Search	IOC,VOC, SOC
27	Farm Supply	6	Database Search	IOC, VOC, SOC
28	Forestry Service	10	Database Search	VOC, SOC
29	Wastewater Land Application	10	Database Search	IOC, M
30	State Government	10	Database Search	VOC, SOC
31	Sports Center	10	Database Search	VOC, SOC
32	Gas Station	10	Database Search	VOC, SOC
33	UST	10	Database Search	VOC, SOC
34	Auto Dealer	10	Database Search	VOC, SOC
35	Cabinet Maker	10	Database Search	VOC, SOC
36	Analytical Lab	10	Database Search	IOC, VOC, SOC
37	Auto Repair	10	Database Search	IOC, VOC, SOC
38	Farm Equipment	10	Database Search	IOC, SOC
39	Carpet Cleaners	10	Database Search	IOC, VOC, SOC
40	Tractor Dealer	10	Database Search	VOC, SOC

**Table 2 (Continued). University of Idaho Well 4, Potential Contaminant Inventory**

SITE #	Source Description <sup>1</sup>	TOT Zone <sup>2</sup> (years)	Source of Information	Potential Contaminants <sup>3</sup>
41	Boat Dealer	10	Database Search	IOC, VOC, SOC
42	Dairy Products	10	Database Search	IOC, VOC, SOC, M
43	Auto Repair	10	Database Search	IOC, VOC, SOC
44	Water Treatment Supplies	10	Database Search	IOC, VOC, SOC
45	General Contractor	10	Database Search	IOC, VOC, SOC
46	Household Storage	10	Database Search	IOC, VOC, SOC
47	Engraving Shop	10	Database Search	IOC, VOC, SOC
48	Auto Repair	10	Database Search	IOC, VOC, SOC
49	Electric Supply	10	Database Search	IOC, VOC
50	Household Storage	10	Database Search	IOC, VOC, SOC
51	Painter	10	Database Search	IOC, VOC, SOC
52	Photo Shop	10	Database Search	IOC, VOC
53	Auto Repair	10	Database Search	IOC, VOC, SOC
54	Household Storage	10	Database Search	IOC, VOC, SOC
55	Boat Builder	10	Database Search	IOC, VOC, SOC
56	Household Storage	10	Database Search	IOC, VOC, SOC
57	Auto Dealer	10	Database Search	IOC, VOC, SOC
58	General Contractor	10	Database Search	IOC, VOC, SOC
59	Household Storage	10	Database Search	IOC, VOC, SOC
60	Air Field	10	Database Search	IOC, VOC, SOC
61	Tractor Dealer	10	Database Search	IOC, VOC, SOC
62	Auto Salvage	10	Database Search	IOC, VOC, SOC
63	Auto Repair	10	Database Search	IOC, VOC, SOC
64	Auto Repair	10	Database Search	IOC, VOC, SOC
65	Mine	10	Database Search	IOC

**LUST = leaking underground storage tank, UST = underground storage tank,**

**SARA = Superfund Amendments and Reauthorization Act site**

<sup>2</sup>**TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**

<sup>3</sup>**IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

**M = microbials**



**Table 3. Summary of University of Idaho Susceptibility Evaluation**

Well	Susceptibility Scores <sup>1</sup>									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well 3	L	H	H	H	M	L	H	M	M	M
Well 4	L	H	H	H	M	L	H	L	L	L

<sup>1</sup>H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility, IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

## Appendix C

# University of Idaho Water System Susceptibility Analysis Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

1. System Construction

SCORE

Drill Date	9/30/63	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES 1/12/96	1
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	YES	0
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0

Total System Construction Score 1

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	YES	0
Aquitard present with > 50 feet cumulative thickness	YES	0

Total Hydrologic Score 1

3. Potential Contaminant / Land Use - ZONE 1A

IOC Score VOC Score SOC Score Microbial Score

Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		3	1	3	1

Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)	YES	99	99	99	12
(Score = # Sources X 2 ) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	6	39	11	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	25 to 50% Irrigated Agricultural Land	2	2	2	2

Total Potential Contaminant Source / Land Use Score - Zone 1B 14 14 14 10

Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	25 to 50% Irrigated Agricultural Land	1	1	1	

Potential Contaminant Source / Land Use Score - Zone II 4 4 4 0

Potential Contaminant / Land Use - ZONE III

Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	

Total Potential Contaminant Source / Land Use Score - Zone III 3 3 3 0

Cumulative Potential Contaminant / Land Use Score 24 22 24 11

4. Final Susceptibility Source Score

7 6 7 6

5. Final Well Ranking

High Moderate Moderate Moderate

1. System Construction

SCORE

Drill Date	1977	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES 1/12/96	0
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	Yes	1
Casing and annular seal extend to low permeability unit	YES	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	NO	1
Total System Construction Score		0

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	YES	0
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		1

3. Potential Contaminant / Land Use - ZONE 1A

IOC Score      VOC Score      SOC Score      Microbial Score

Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		3	1	3	1

Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)	YES	6	9	6	2
(Score = # Sources X 2 ) 8 Points Maximum		8	8	8	4
Sources of Class II or III leacheable contaminants or	YES	4	1	0	
4 Points Maximum		4	1	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	25 to 50% Irrigated Agricultural Land	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	11	10	6

Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0

Potential Contaminant / Land Use - ZONE III

Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		24	19	20	7

4. Final Susceptibility Source Score

6      5      5      4

5. Final Well Ranking

High      Low      Low      Low